

Overview

Tidal issues are :

1- Mission orbit

- Avoid low aliased frequency, especially around 1 year and 6 months
- Avoid long wave-separation duration (1st accurate tidal analysis from SWOT after about twice this duration)
- Track control: 1 cm/km change in tidal amplitude is quite common in coastal areas. Poor track control will jeopardise accurate tide analysis from SWOT (hence future precise corrections in SWOT followers)

2- Mission data processing

- Efficient correction of barotropic tides short wavelength (shelf, coastal)
- Efficient correction of internal tides surface signature
- Estuaries

Approaches at LEGOS

Global ocean barotropic tides

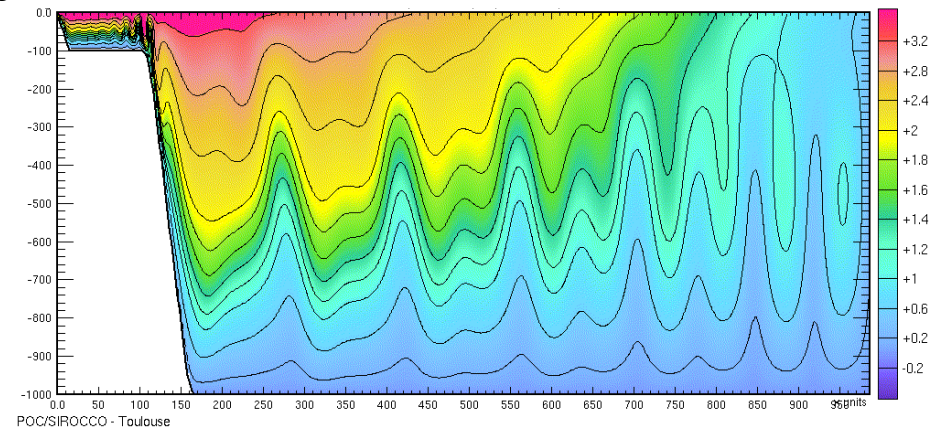
2D and 2D+1 global barotropic spectral (harmonic) modeling

- Improved resolution and bathymetry
- 3D spectral data assimilation

Global ocean internal tides

3D global baroclinic spectral modeling

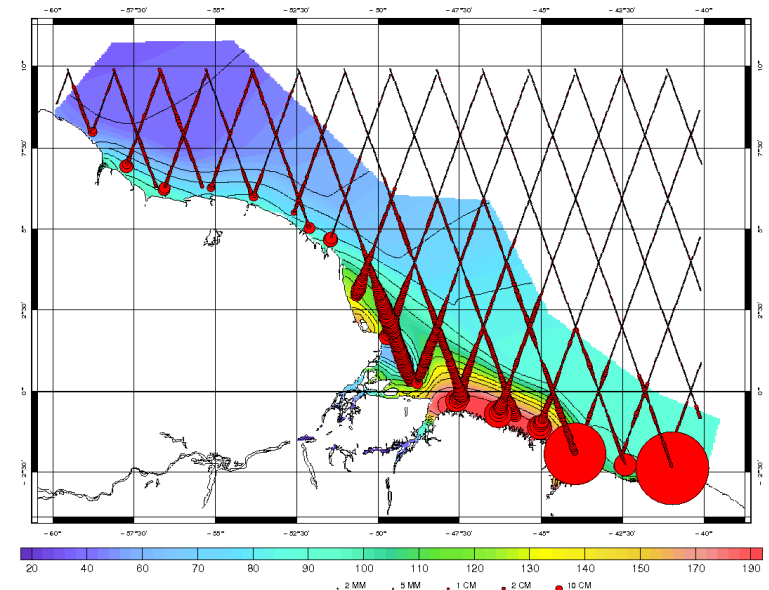
- Finite elements (resolution), triangle and quadrangles
- Turbulence, realistic stratification (OGCM's, climatology)
- Linearized, i.e. non-linear through iterations (typically 10)
- Extremely cheap and efficient
- Allow sensitivity studies (to stratification, turbulence, bathymetry, etc...)
- 3D spectral data assimilation



Estuaries

2D global barotropic spectral and time-stepping modeling (river discharge)

- Dedicated modeling, from the coastal façade up to the tides influence limit
- Very high resolution in river (<50 m)
- Present targets at LEGOS : Seine River (1 PhD), Amazon River, Douala Estuary (1 PhD)



Comments

Main SWOT (tidal) challenge is internal tides:

- spectral modeling is complementary to OGCMs:
 - It has limitations, but it keeps very close to time-stepping modeling
 - Extremely robust
- it is necessary for sensitivity studies
 - Seasonal variability of internal tides
 - Turbulence adjustments
 - Bathymetry
- spectral solver can be plugged-in into structured grid models (HyCOM)
- Spectral data assimilation:
 - Likely to be necessary to achieve accuracy requirements
 - Well-posed assimilation of altimetry data (in contrary to sequential data assimilation)

Close collaboration between tidal groups would be a great help